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Trends in primary care antidepressant prescribing 1995–2007:

a longitudinal population database analysis

Abstract

Background
Antidepressant prescribing is increasing worldwide, prompting policy interventions and targets to halt the rise.

Aim
To examine time trends in GP antidepressant prescribing using patient-level data.

Design and setting
Longitudinal population database of all community pharmacy dispensed prescriptions for all 325 000 residents of the Tayside region of Scotland.

Method
In each of 3 study years (1995/1996, 2000/2001 and 2006/2007), the volume of antidepressants prescribed was calculated, and numbers of patients prescribed antidepressants in each year, mean treatment duration, and mean dose per patient in that year examined using descriptive statistics.

Results
Total drug volume increased threefold between 1995/1996 and 2006/2007, largely driven by increases in selective serotonin reuptake inhibitor (SSRI) prescribing, and laterally also in 'other' antidepressant prescribing. Tricyclic prescribing is static, but low-dose amitriptyline increasingly dominates this drug class. Increased drug volume was initially driven by increasing patient numbers (from 8.0% of the population prescribed at least once in 1995/1996 to 11.9% in 2000/2001) and increased treatment duration (from 170 days in the measurement year to 200). Latterly, drug volume increases are increasingly attributable to longer duration of treatment and higher mean daily dose.

Conclusion
The large rise in antidepressant volumes is caused by a complex mixture of more patients being prescribed SSRI and 'other' antidepressants, the use of higher doses, and longer durations of treatment, with the balance changing over time. Tricyclic prescribing is now largely low dose, and probably for conditions other than depression. Interventions to improve the quality of antidepressant prescribing need to be more subtle than blanket targets to reduce the total volume of antidepressants prescribed.

Keywords
antidepressant drugs; family practice; prescribing patterns; Scotland.

INTRODUCTION

Mental illness is an increasingly common problem across all countries, with depression predicted to come second only to cardiovascular disease as a cause of morbidity by 2020.[1] In response to evidence that depression is often under-detected and under-treated, there have been a number of initiatives since the 1990s to improve diagnosis and treatment.[2,3] At least partly as a result, the volume of antidepressant prescribing has increased dramatically in developed countries over the last 20 years.[4–6] In Scotland, prescribing volume quadrupled between 1993–1994 and 2005–2006 from 18 to 85 defined daily doses (DDDs — a standard measure of prescribing volume[7]) per 1000 population,[4] similar to changes observed in England[5] and the US.[6] In the UK, this has led to concern that antidepressants are being overused,[8,9] with policy makers setting targets to stabilise or reduce antidepressant prescribing.[10] Possible reasons for the large increase in prescribing volume include the availability of new drugs, changing diagnostic criteria and patient expectations, previous policy that sought to increase detection and treatment of depression, and poor availability of non-pharmacological treatments.[11–14] Additionally, it is important to recognise that antidepressant drugs are used for a wide range of conditions beyond depression, both because diagnostic categories in mental illness and psychological distress are blurred, and because of expansion of treatment to new indications.[15] Understanding antidepressant prescribing therefore requires more than examining the management of formally diagnosed depression.

Two studies have examined changing patterns of antidepressant prescribing in the UK. The first examined Scottish population-level data and concluded that rising rates of prescribing were not associated with increased incidence or prevalence of mental illness, increased identification of depression, or increased care-seeking behaviour.[16] The second examined longitudinal trends in prescribing for patients with first-ever episodes of depression, using the General Practice Research Database.[17] It concluded that no more patients were being diagnosed with depression, and that the increased volume of prescribing of antidepressants for patients in the cohort was predominately due to increasing numbers receiving long-term treatment. This study gives valuable insight into changing treatment patterns in patients with first-ever episodes of depression, but patients being prescribed antidepressants for recurrent or chronic depression, or for other indications, were excluded.

The aim of this study was to use a patient-level antidepressant prescribing dataset for a complete population, to examine changes in antidepressant volume, the proportion of patients prescribed antidepressants, the duration of antidepressant use, and the dose of antidepressants prescribed.

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How this fits in

Prescribing of antidepressants has increased significantly in many countries, despite little evidence of an associated increased incidence or prevalence of mental illness, increased detection of depression, or increased care-seeking behaviour. This study shows that over the period 1995/1996 to 2006/2007, the increase was initially driven by a combination of large increases in patients prescribed and increases in the duration of treatment, but latterly more by increases in duration of treatment and the mean dose prescribed. However, patterns of change varied considerably by class of drugs, indicating that simple targets to reduce antidepressant prescribing are unlikely to be effective.

METHOD

Data on GP antidepressant prescriptions dispensed by community pharmacists to all residents of the Tayside region of Scotland were obtained from the University of Dundee Health Informatics Centre (HIC). Each prescription has a unique patient identifier (the CHI number), allowing the creation of patient prescribing histories. The Tayside population is well matched to the UK population in terms of age, sex, and socioeconomic deprivation, although there are relatively few people from ethnic minorities. Data were extracted for all antidepressants (defined as drugs in section 4.3 of the *British National Formulary* [*BNF*][18]) prescribed in three 1-year periods from October to September 1995/1996, 2000/2001, and 2006/2007, with additional data for 3 months on either side of these dates to allow accurate estimation of treatment duration in the selected 1-year period. Additional patient demographic data were extracted (age, sex, and socioeconomic status measured by the Scottish Index of Multiple Deprivation quintile[19]). Patients dying or leaving the region were excluded, and mid-year population estimates from the General Registrar for Scotland were used to calculate prescribing rates.[20]

For each 1-year period, the number of patients receiving any antidepressant prescription in that year was calculated, as was the number of patients receiving any prescription for selective serotonin reuptake inhibitors (SSRIs, defined as drugs in *BNF* section 4.3.3), tricyclic antidepressants (TCADs, *BNF* 4.3.1), other antidepressants (*BNF* 4.3.4), and monoamine oxidase inhibitors (MAOIs, *BNF* 4.3.2). Defined daily dose (DDD) is a standard approximation used for defining drug doses, and is useful when estimating population drug burden (Table 1).[7] Total DDDs dispensed per patient in each of the 3 years examined were calculated. The 'in-year' treatment duration was calculated by summing individual prescriptions' treatment lengths, with an assumed duration of the final prescription in a series of 30 days. Prescriptions before and after the year being examined were used to ensure that 'in-year' treatment duration was correctly estimated for patients on long-term treatment. Mean DDDs per patient in the entire year, and mean DDDs per 28 days of treatment in each year were calculated.

Crude and age–sex-standardised percentages of patients prescribed any antidepressant were calculated, and variation in the percentage prescribed an antidepressant examined by age, sex, and socioeconomic deprivation. Prescribing rates were additionally calculated for the three main drug classes (SSRI, TCAD and

Table 1. DDD values and typical dose ranges for commonly prescribed antidepressants[7]

BNF section	Drug class	Drug name	WHO DDD value (mg)	Range of dosing described in *BNF* (mg)
4.3.1	Tricyclic antidepressants (TCADs)	Amitriptyline	75	10–200
		Dothiepin	150	50–225
		Lofepramine	105	140–210
		Trazadone	300	75–600
4.3.3	Selective serotonin reuptake inhibitors (SSRIs)	Citalopram	20	10–60
		Escitalopram	10	5–20
		Fluoxetine	20	20–60
		Paroxetine	20	10–50
		Sertraline	50	25–200
4.3.4	Other antidepressants	Duloxetine	60	60
		Mirtazepine	30	15–45
		Venlafaxine	100	75–375

BNF = British National Formulary. *DDD = defined daily dose. WHO = World Health Organization.*

'other' antidepressants). Total DDDs, mean DDDs per patient, mean duration of treatment per patient, and mean DDDs per 28 days per patient were calculated for all antidepressants and the three main drug classes. Change over time was assessed using χ^2 tests for proportions, and one-way analysis of variance with Tukey post hoc tests for continuous variables. However, given the size of the dataset, virtually any comparison is likely to be statistically significant, and the magnitude of differences should be carefully considered for clinical significance.

The project used fully anonymised data with Caldicott Guardian approval according to the HIC Standard Operating Procedures, and NHS research ethics committee approval was therefore not required. All analysis was conducted using SPSS (version 17.0).

RESULTS

The percentage of the population prescribed an antidepressant rose significantly from 8.0% (25 989/324 670) in 1995/1996 to 11.9% (38 551/322 527) in 2000/2001 and 13.4% (43 923/327 723) in 2006/2007 (Table 2). Large increases in the numbers of patients prescribed occurred in patients aged ≥35 years, with the greatest increase occurring in the ≥85 years age group (6.7%). Prescribing rose more modestly in younger patients, with a 2.0% increase in the 16–24 years age group. Prescribing increased for both women and men, with a larger rise in women, who remained twice as likely as men to receive an antidepressant. There was no consistent gradient of either antidepressant use, or increases in antidepressant use by socioeconomic status measured by the postcode-assigned Scottish Index of Multiple Deprivation (SIMD).[19] The largest increase in prescribing by deprivation category was observed in the second-least deprived population quintile (SIMD[2]), with the second highest rise noted in the most deprived quintile (SIMD[5]). Those in SIMD[4] remained the least likely to be prescribed an antidepressant, and prescribing in this sector rose by only 2.3% (95% confidence interval [CI] = 2.1 to 2.5).

Tables 3 and 4 show changes in the percentage of patients prescribed each of the three main drug classes, and Table 5 the same for the most commonly prescribed individual drugs. The number of patients prescribed MAOIs was consistently small across all three periods (*n* = 212, 183, and 182; all <0.1% of the population), and detailed data on MAOIs are not shown. SSRIs were prescribed to 11 391 (3.6%) patients in 1995/1996, more than doubling to 25 879 (7.9%) patients in 2006/2007. Fluoxetine and paroxetine accounted for the majority of SSRI prescribing in 1995/1996, but although fluoxetine remained a commonly used drug in 2006/2007, there is a striking increase in citalopram and, latterly, escitalopram prescribing (Table 5). TCAD prescribing rates were essentially constant (5.2% in both 1995/1996 and 2006/7). However, amitriptyline increasingly

Table 2. All antidepressant prescribing by age group, sex, and SIMD quintile, and crude and age–sex-standardised rates

	1995–1996 (*n* = 324 670)	2000–2001 (*n* = 322 527)	2006–2007 (*n* = 327 723)	Difference 2006/2007 minus 1995/1996, % (95% CI)
Number of patients prescribed	25 989	38 551	43 923	
Crude rate (% patients prescribed)	8	11.9	13.4	5.4 (5.2 to 5.5)
Age–sex-standardised rate[a] (% patients prescribed)	8	11.9	13.1	5.2 (5.0 to 5.3)
Age group, years[b]				
16–24	3.4 (1764)	5.0 (2902)	5.4 (2726)	2.0 (1.7 to 2.2)
25–34	7.1 (4086)	11.5 (5702)	12.3 (5246)	5.2 (4.9 to 5.6)
35–64	9.5 (14 004)	13.6 (21 008)	15.5 (25 011)	6.0 (5.7 to 6.2)
65–84	9.0 (5469)	12.7 (7799)	14.8 (9580)	5.8 (5.5 to 6.2)
≥85	8.9 (666)	13.8 (1140)	15.6 (1360)	6.7 (5.7 to 7.7)
Sex				
Male[b]	4.8 (7403)	7.6 (11 621)	8.8 (13 689)	4.0 (3.8 to 4.2)
Female	10.9 (18 586)	15.8 (26 930)	17.6 (30 234)	6.7 (6.5 to 6.9)
SIMD quintile[b]				
1 (affluent)	4.1 (3563)	7.0 (5399)	8.5 (6272)	4.4 (4.1 to 4.6)
2	9.7 (6697)	15.3 (10 320)	17.0(11 601)	7.3 (6.9 to 7.6)
3	6.0 (4331)	9.4 (6329)	9.8 (7314)	3.9 (3.6 to 4.1)
4	3.9 (4650)	9.6 (6994)	6.2 (8056)	2.3 (2.1 to 2.5)
5 (deprived)	8.3 (6058)	7.1 (8855)	13.1 (10 031)	4.8 (4.5 to 5.1)
Missing	3.0 (480)	0.9 (654)	4.7 (649)	1.7 (1.2 to 2.1)

[a]Directly standardised to the 1995/1996 Tayside population. [b]Proportion of comparable population, absolute number.

Table 3. Antidepressant prescribing by drug class, crude and age–sex-standardised rates

	SSRI antidepressant			Tricyclic antidepressant			Other antidepressant		
	1995–1996	2000–2001	2006–2007	1995–1996	2000–2001	2006–2007	1995–1996	2000–2001	2006–2007
Total number of patients	11 391	22 873	25 879	16 756	17 088	16 898	584	3416	6117
Crude rate (% patients prescribed each drug)	3.6	7.1	7.9	5.2	5.3	5.2	0.2	1.1	1.9
Difference in crude rate, 2007–1995 (95% CI)			4.4 (4.30 to 4.50)			0.0 (–0.001 to 0.001)			1.7 (1.64 to 1.74)
Age–sex-standardised rate[a]	3.6	7.1	7.9	5.2	5.2	5.0	0.2	1.0	1.9
Difference in standardised rate 2007–1995 (95% CI)			4.3 (4.20 to 4.50)			–0.3 (–0.16 to –0.37)			1.7 (1.62 to 1.72)

[a]*Directly standardised to the 1995/1996 Tayside population. SSRI = selective serotonin reuptake inhibitor.*

Table 4. Antidepressant prescribing for each drug class by age group, sex and SIMD quintile

	SSRI antidepressant			Tricyclic antidepressant			Other antidepressant		
	1995–1996	2000–2001	2006–2007	1995–1996	2000–2001	2006–2007	1995–1996	2000–2001	2006–2007
Age group, years									
16–24	2.1 (1111)	4.7 (2286)	4.3 (2188)	1.5 (802)	1.4 (705)	0.9 (476)	0.1 (37)	0.5 (265)	0.8 (388)
25–34	4.2 (2411)	8.6 (4278)	9.0 (3841)	3.7 (2140)	3.3 (1657)	2.9 (1216)	0.2 (101)	1.2 (606)	2.1 (881)
35–64	4.2 (6148)	7.9 (12 551)	9.4 (15 092)	6.2 (9058)	6.0 (9297)	5.8 (9327)	0.2 (351)	1.3 (2004)	2.2 (3563)
65–84	2.5 (1526)	5.3 (3260)	6.3 (4091)	7.0 (4239)	7.7 (4754)	8.2 (5295)	0.1 (89)	0.8 (478)	1.7 (1080)
85+	2.6 (195)	6.0 (498)	7.6 (667)	6.9 (517)	8.2 (675)	6.7 (584)	0.1 (6)	0.8 (63)	2.3 (205)
Sex									
Male	2.1 (3244)	4.4 (6664)	4.9 (7666)	3.1 (4702)	3.4 (5139)	3.4 (5236)	0.1 (181)	0.7 (1138)	1.4 (2186)
Female	4.7 (8147)	9.5 (16 209)	10.6 (18 213)	7.0 (12 054)	7.0 (11 949)	6.8 (11 662)	0.2 (403)	1.3 (2278)	2.3 (3931)
SIMD quintile									
1 (affluent)	1.8 (1578)	4.2 (3267)	5.0 (3708)	2.6 (2259)	3.9 (2241)	3.2 (2455)	0.1 (75)	0.5 (413)	1.0 (697)
2	4.3 (2932)	9.0 (6063)	8.9 (6770)	6.3 (4313)	6.7 (4546)	6.6 (4597)	0.2 (135)	1.2 (840)	2.0 (1366)
3	2.7 (1947)	5.2 (3800)	5.7 (4264)	3.7 (2689)	3.8 (2749)	3.9 (2891)	0.1 (93)	0.7 (537)	1.2 (933)
4	1.8 (2155)	3.4 (4243)	3.7 (4828)	2.6 (3176)	2.5 (3137)	2.3 (3061)	0.1 (88)	0.5 (569)	1.0 (1191)
5 (deprived)	3.5 (2548)	6.7 (5091)	7.7 (5893)	5.5 (4029)	5.5 (4161)	4.8 (3686)	0.2 (181)	1.3 (992)	2.4 (1846)
Missing	1.4 (231)	3.0 (409)	1.6 (416)	1.8 (290)	1.9 (254)	1.5 (208)	0.1 (12)	0.5 (65)	1.0 (84)

SIMD = Scottish Index of Multiple Deprivation.

Table 5. Numbers of patients with at least one prescription for particular antidepressants in the measurement year

Drug class and name	Number of patients (%)		
	1995/1996 (*n* =324 670)	2000/2001 (*n* =322 527)	2006/2007 (*n* = 327 723)
SSRIs			
Fluoxetine	5302 (1.6)	10 110 (3.1)	9245 (2.8)
Paroxetine	5680 (1.7)	2380 (0.7)	2376 (0.7)
Sertraline	1734 (0.5)	2380 (0.7)	1974 (0.6)
Fluvoxamine	211 (0.1)	51 (<0.1)	25 (<0.1)
Citalopram	120 (<0.1)	4645 (1.4)	11 018 (3.4)
Escitalopram	0	0	2869 (0.9)
Tricyclics			
Amitriptyline	7826 (2.4)	10 094 (3.1)	11 992 (3.7)
Dosulepin	5380 (1.7)	4063 (1.3)	2006 (0.6)
Lofepramine	2447 (0.7)	1913 (0.6)	1037 (0.3)
Clomipramine	875 (0.3)	671 (0.2)	456 (0.1)
Trazodone	834 (0.3)	1054 (0.3)	1125 (0.3)
Imipramine	777 (0.2)	474 (0.2)	309 (0.1)
Other tricyclics	1413 (0.4)	886 (0.3)	595 (0.2)
'Other'			
Venlafaxine	358 (0.1)	2450 (0.8)	2340 (0.7)
Flupenthixol	248 (<0.1)	154 (<0.1)	125 (<0.1)
Nefazadone	90 (<0.1)	352 (0.1)	0
Mirtazapine	0	943 (0.3)	3549 (1.1)
Reboxetine	0	209 (0.1)	120 (<0.1)
Duloxetine	0	0	341 (0.1)

SSRI = selective serotonin reuptake inhibitor.

Table 6. Absolute and relative changes in total drug volume (expressed as DDDs), total numbers of patients prescribed in each year, mean dose per patient in that year (DDDs per patient), mean days of treatment per patient in each year, and mean DDDs per patient per 28 days' treatment

	1995–1996	2000–2001	2006–2007	Absolute change (% change compared to 1995 baseline) 1995/1996 to 2000/2001	Absolute change (% compared to 1995 baseline) 1995/1996 to 2006/2007	Statistical test and significance
All antidepressants						
Total DDDs	3 412 374	7 537 655	10 649 963	4 125 281 (121.0)	7 237 589(212.0)	
Total patients	25 989	38 551	43 923	12 562 (48.3)	17 934 (69.0)	χ^2 = 4686, 2df, *P*<0.001
Mean DDDs/patient (SE)	136.6 (1.15)	197.7 (1.12)	242.7 (1.21)	61.1 (44.7)[a]	106.1 (77.7)[a]	ANOVA *F* = 1767, 2df, *P* = 0.001
Mean days' treatment/ patient (SE)	170.0 (0.81)	200.2 (0.70)	230.0 (0.71)	30.2 (17.8)[a]	60.0 (35.3)[a]	ANOVA *F* = 1472, 2df, *P* = 0.001
Mean DDDs/patient/ 28 days (SE)	20.1 (0.11)	25.1 (0.1)	26.4 (0.09)	5.0 (24.9)[a]	6.3 (31.3)[a]	ANOVA *F* = 919, 2df, *P* = 0.00
SSRI antidepressants						
Total DDDs	1 616 924	4 729 950	6 931 688	3 113 026 (192.5)	5 314 764 (328.7)	
Total patients	11391	22873	25879	11 482 (101.1)	14 488 (127.2)	χ^2 = 5382, 2df, *P*<0.001
Mean DDDs/patient (SE)	152.1 (2.05)	210.3 (1.46)	267.9 (1.56)	58.2 (38.3)[a]	115.8 (76.1)[a]	ANOVA *F* = 1013, 2df, *P* = 0.001
Mean days' treatment/ patient (SE)	136.9 (1.02)	174.2 (0.80)	205.8 (0.78)	37.3 (27.2)[a]	68.9 (50.3)[a]	ANOVA *F* = 1344, 2df, *P* = 0.001
Mean DDDs/patient/ 28 days (SE)	27.6 (0.20)	31.1 (0.1)	33.3 (0.12)	3.5 (12.7)[a]	5.7 (20.7)[a]	ANOVA *F* = 314, 2df, *P* = 0.00
Tricyclic antidepressants						
Total DDDs	1 726 871	2 108 981	2 137 540	382 110 (22.1)	410 669 (23.8)	
Total patients	16 756	17 088	16 898	332 (2.0)	142 (0.8)	χ^2 = 3.3, 2df, *P* = 0.194
Mean DDDs/patient (SE)	106.1 (1.06)	124.7 (1.28)	126.8 (1.40)	18.6 (17.5)[a]	20.7 (19.5)[b]	ANOVA *F* = 82, 2df, *P* = 0.001
Mean days' treatment/ patient (SE)	166.0 (1.00)	182.8 (1.03)	202.4 (1.06)	16.8 (10.1)[a]	19.6 (21.9)[a]	ANOVA *F* = 312, 2df, *P* = 0.001
Mean DDDs/patient/ 28 days (SE)	15.6 (0.1)	16.3 (0.11)	14.3 (0.12)	0.7 (4.5)[a]	–1.3 (–8.3)[a]	ANOVA *F* = 92, 2df, *P* = 0.001
Other antidepressants						
Total DDDs	28987	655 474	1 527 721	626 487 (2126.3)	1 498 734 (5170.4)	
Total patients	584	3416	6117	2832 (485.0)	2701 (947.4)	χ^2 = 4540, 2df, *P*<0.001
Mean DDDs/patient (SE)	53.7 (3.36)	193.0 (3.80)	250.2 (3.28)	139.3 (259.4)[a]	196.5 (366.0)[a]	ANOVA *F* = 202, 2df, *P* = 0.001
Mean days' treatment/ patient (SE)	110.5 (4.15)	167.7 (2.19)	214.5 (1.81)	57.2 (51.8)[a]	104 (94.1)[a]	ANOVA *F* = 246, 2df, *P* = 0.001
Mean DDDs/patient/ 28 days (SE)	14.3 (0.62)	28.2 (0.49)	27.9 (0.23)	13.9 (97.2)[a]	13.6 (95.1)[a]	ANOVA F = 100, 2df, *P* = 0.001

ANOVA = analysis of variance. df = degrees of freedom. SE = standard error. [a]Tukey post hoc significance testing, P<0.05.

dominated tricyclic prescribing, with falls in the use of all other drugs, with the exception of trazodone which modestly increased (Table 5). The drugs included in the 'other antidepressant' category were prescribed to only 584 (0.2%) patients in 1995/1996, but to 6117 (1.9%) patients 10 years later. Mirtazapine was the most commonly prescribed drug in 2006/2007, although the halting of the rise in venlafaxine prescription is likely to be associated with the (temporary) shift of its status to specialist only prescribing, and may not have been sustained (Table 5).

Age–sex-standardised rates generally mirror crude rates, indicating that the changing population structure has had little influence on prescribing patterns. Both SSRIs and 'other antidepressants' are prescribed to similar proportions of each age group, but TCADs are more commonly prescribed in middle-aged and older people. Prescribing by sex and socioeconomic status for each drug class mirrors the overall pattern, with the exception of proportionally higher prescribing of 'other antidepressants' observed in males and high social deprivation in the latter time frame, and a decrease in prescribing of TCADs in the two

most deprived quintiles. Importantly, many patients are prescribed more than one drug in any 1 year. For example, of the 9245 patients prescribed fluoxetine, at least once in 2006/2007, 1086 (11.7%) also received at least one prescription for a different SSRI, 1053 (11.4%) for a tricyclic and related drug, 610 (6.6%) for an 'other' antidepressant, and six (0.1%) for an MAOI.

Table 6 shows how total drug volume, number of patients prescribed, mean days' treatment per patient, and mean dose per patient per 28 days' treatment changed over time. All figures refer to 'in-year' treatment (that is, drugs prescribed in the calendar years 1995/1996, 2000/2001, and 2005/2006), rather than prescribing across a complete treatment episode (which may be many years long). In 1995/1996, 3 412 374 antidepressant DDDs were dispensed to 25 989 patients. The mean number of DDDs per patient was 136.6, while the mean number of days' treatment was 170.0. Total antidepressant DDDs more than tripled between 1995/1996 and 2006/2007 to 10 649 963. Initially (1995/1996 to 2000/2001), increases were largely driven by increases in the numbers of patients treated and mean duration of treatment. Latterly (2000/2001 to 2006/2007), increases were more driven by further increases in treatment length and the use of higher doses than by increasing numbers of patients prescribed. Changes in SSRI prescribing patterns mirror overall antidepressant prescribing. In contrast, total TCAD DDDs prescribed rose only slightly, driven entirely by increasing mean treatment length across the whole period, and a small increase in mean dose per patient between 2000/2001 and 2006/2007. 'Other antidepressant' drug volume increased dramatically, with sustained increases in patient numbers, treatment duration, and mean doses.

DISCUSSION

Summary

This study found that total antidepressant DDDs dispensed more than tripled between 1995/1996 and 2005/2006, due to a mixture of more patients being prescribed higher mean doses of drugs for longer. The contribution of these three factors varied depending on the drug class and time period examined, and between different drugs in the same class. Increased prescribing was experienced by all age groups, men and women, and all socioeconomic groups (although increases were smaller for younger people, men, and the most affluent). SSRI prescribing showed a similar pattern to total prescribing, but with shifts away from older drugs like paroxetine and sertraline to citalopram and escitalopram. TCAD prescribing was relatively static in terms of numbers of patients treated, with only small changes in treatment duration and mean dose, but there was a marked shift to increasing use of amitriptyline. In contrast, there were very large increases in 'other antidepressant' prescribing, driven by large rises in the number of patients prescribed across the whole period, and, latterly particularly, by increases in treatment length.

Strengths and limitations

A key strength of this study is that the analysis is based on patient-level dispensed prescribing data for an entire regional population, rather than practice-level data on total drug volume.[2–4,7,10] A weakness is the lack of clinical data on indication for prescribing.

Comparison with existing literature

Notably, the results of this study differ from those of the study by Moore *et al*, of antidepressant prescribing for those with first-ever depression.[17] That study concluded that there had been little change in diagnosis or antidepressant initiation, and that rising antidepressant volumes were largely driven by more patients being prescribed antidepressants long term.[21] There was some evidence of increasing long-term use in the present study. Whereas 11 639 (30.2%) patients prescribed an antidepressant in 2000/2001 were also prescribed one in 1995/1996, 17 332 (39.5%) prescribed in 2006/2007 were also prescribed in 2000/2001. However, the present study also found that the proportion of patients treated increased significantly over 10 years, as did mean doses used. An explanation for the difference is that antidepressants have a range of uses beyond depression, with these uses increasingly promoted by both clinical guidelines (for example for irritable bowel syndrome[22]) and the pharmaceutical industry.[15] Analysing overall patterns of prescribing is therefore complementary to analyses by indication.

Implications for practice and research

Policy and guidance on antidepressant prescribing has sometimes seemed contradictory. Recent policy has promoted blanket reductions in total prescribing volume because of assumed overuse,[10] but older guidance in particular emphasised under-detection and under-treatment of

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Competing interests

The authors have declared no competing interests.

Ethical approval

The study had Caldicott Guardian approval, only used fully anonymised data, and was fully compliant with the Standard Operating Procedures of the Health Informatics Centre, University of Dundee. NHS Research Ethics Committee approval was therefore not required.

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depression, and promoted more prolonged use of antidepressants.[2,3,21] There clearly have been large increases in the number of people prescribed SSRIs and 'other' antidepressants like venlafaxine, mirtazapine, and duloxetine. However, the increase in drug volume has also been significantly driven by longer durations of treatment and increasing average doses, which are at least partly consistent with guideline-recommended management.[11,13]

The present study cannot directly examine this because no data are available on indication, but this interpretation is supported by the study of Moore *et al*.[17] In contrast, TCAD prescribing was essentially static in volume (although it still accounted for ~20% of antidepressant volume in 2006/2007), and increasingly consisted of low-dose amitriptyline. This is consistent with TCADs being used for a range of largely un-licensed but sometimes guideline-recommended indications, such as chronic pain, fibromyalgia, irritable bowel syndrome, and anxiety, psychological distress, and night sedation (at least partly to avoid the use of benzodiazepines, which prescribing-improvement activity has often focused on reducing).[18,22,23] Of concern is the increasing use of TCADs in older people, in whom the risk of anticholinergic side effects, including falls and cognitive impairment, is greatest.[24]

The key policy implication is that improving the quality of antidepressant prescribing will require a more multifaceted approach than simply focusing either on total antidepressant volume (because the factors driving changes vary by drug class) or the management of depression (since all antidepressants are used for a range of indications, and TCADs seem likely to be predominately used for other indications).

There are several areas where further research would be beneficial. First, it is important to better understand when and why patients are prescribed antidepressants for conditions other than depression, and to create better evidence of effectiveness of antidepressants in these other conditions. Secondly, there is relatively little evidence for the effectiveness of long-term antidepressant treatment in people with depression in primary care.[21] Although there is justified concern about lack of review for this group of patients,[17] there is relatively little evidence as to the likely prognosis if antidepressants are continued or stopped. Thirdly, it would be useful to better understand why and how new and more expensive drugs with little clear benefit over older drugs become established in local prescribing cultures. Finally, there is a need for the routine monitoring of antidepressant prescribing at patient level, rather than solely measuring drug volume. This should be feasible, given that almost all primary care prescribing is now done on computer and therefore recorded in a retrievable form, and particularly once true electronic prescribing is fully implemented.

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